PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in or relating to the Production of Combustible Gas

I, JAMES TYHURST COLLIER, a British Subject, of 73, Coggeshall Road, Marks Tey, Colchester, Essex, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the production of combustible gas, the object being to provide an improved process.

According to this invention, a method of producing combustible gas comprises charging natural or synthetic rubber or synthetic resinous material or other combustible materials which produce obnoxious smells when burnt in a stove or furnace into a chamber, creating a fire at or below the bottom of the charge of material in the said chamber, withdrawing hot combustion gases from said fire through a wall enclosing said chamber, readmitting said hot combustion gases to the charge of materials at a substantially higher level in the said chamber, and taking off the gases evolved.

Scrap rubber, such as old and worn rubber tyres from vehicle wheels, can be used to provide combustible gas according to this invention. The gases so evolved are useful for many industrial purposes.

The scrap rubber may thus be decomposed in a gas producer so that it is heated to such a temperature as to decompose without burning, and thereby give off combustible gases without producing the obnoxious smells and smoke which are produced when scrap rubber is burnt in a stove or furnace.

One embodiment of the invention, and one form of apparatus for carrying it out, are illustrated in the accompanying drawing which is a sectional elevation.

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In this specification the term "gasify" or "gasifying" means converting to gas and does not imply a reaction with a gas such as air, oxygen, CO_2 or steam.

A gas producer comprises a firing chamber or furnace 11, a gasifying chamber 12, a feed throat 13, and a feed hopper 14. The gasifying chamber 12 and the feed hopper 14 may be substantially cylindrical in plan, whilst the firing chamber 11 and the feed throat 13 may be substantially rectangular in plan.

The firing chamber 11 contains fire bars 15, and the gasifying chamber 12 is surrounded by an annular wall 16 of refractory material which is supported on a steel ring 17 which is spaced at a suitable distance above the fire bars 15.

The refractory annular wall 16 of the gasifying chamber 12 is formed of inner and outer skins 18 and 19, respectively, which are spaced from each other to provide an annular space 20 therebetween. The annular space 20 contains one or more helically disposed webs 21 which extend between the inner and outer wall skins 18 and 19 so as to form the annular space 20 into one or more helical passages 21 which rise progressively from the supporting ring 17 at the bottom of the wall 16 to a closing ring 22 at the top of said wall.

At intervals throughout the height of the wall 16 and around said wall, there are provided openings 23 in the inner skin 18 which provide communication between the gasifying chamber 12 and the helical passages 21. Other openings 24 are provided in the outer skin 19, there being one opening 24 aligned, radially of the chamber 12, with each opening 23. Each opening 24 is provided with a movable, for example hinged, closure plate 25 to pro-

vide access to the openings 23 whereby plugs 26, for the purpose hereinafter described, can be placed in or removed from appropriate openings 23.

The closing ring 22 at the top of the wall 16 extends inwardly beyond the inner wall skin 18, towards the axis of the gasifying chamber 12 and is provided with poke holes 27 furnished with closure devices 28.

The feed throat 13 is supported upon the ring 22, and in turn the said throat supports the hopper 14.

A counterbalanced door 29, provided with a handle 30, normally forms a closure between the feed hopper 14 and the throat 13, and a floor to the feed hopper 14. The top of the feed hopper 14 is closed normally by a movable plate 31.

In use, a bed 32 of ashes, which may be the ashes of previously burnt rubber tyres, other rubber scrap, or clinker, is formed upon the fire bars 15 so as to leave an air space 33, the said bed of ashes extending upwards to slightly above the level of the ring 17 supporting the wall 16 so that said bed extends slightly upwards into the gasifying chamber 12. The gasifying chamber 12 is then filled with scrap rubber or plastic material, such as old rubber tyres. The scrap rubber is first charged into the feed hopper 14 through the cover plate 31, and then is released into the chamber 14, through the throat 13, by opening the door 29.

The scrap rubber at the bottom of the charge, that is, immediately above the ash bed 32, is then ignited, for example, by means of a torch inserted through lower openings 23, 24, air being admitted to the air spaces 33 through suitable inlets and, preferably, from a fan, and also from below the fire bars 15.

A fire bed 34 will become established and some of the hot gases therefrom will rise through the mass 35 of scrap rubber fuel and gasify said fuel. The remainder of the gases evolved on the fire bed will pass through the openings 23 at the lower end of the wall skin 18 into the helical passages 21 and flow therethrough upwards, the said gases then re-entering the chamber 12 through upper openings 23. The position at which the combustion gases re-enter the chamber 12 is controlled by closing appropriate openings 23 with plugs 26.

The hot combustion gases which re-enter the chamber 12 through the higher openings 23 will heat the scrap rubber fuel and gasify it by causing the said fuel to decompose without burning, as substantially no oxygen, which would cause the fuel to burn, will be admitted to the upper portion of the gasifying chamber 12. The combustion gases re-entering the chamber 12 from the helical passages 21 will have a sufficiently high temperature to crack the molecules of gas evolved from the decomposing fuel.

The gases evolved from the scrap rubber fuel are taken away from the top of the chamber 12 in any suitable manner, for example through a conduit extending from a wall of the feed throat 13, and led to a suitable destination where they can be burnt as useful fuel, for example, in a brick-making kiln or other furnace.

The ash in the bed 32 can be removed through the fire bars 15 by a suitable poking bar. The scrap fuel can be poked, if it tends to stick in the chamber 12 during its descent therein, by suitable bars inserted through the poke holes 27 or through aligned openings 23 and 24.

By forming the passages 21 in a helical manner in the wall 16, the hot combustion gases rising therein will tend to maintain an even temperature around the chamber 12 and thus prevent hot and cold spots or areas developing; however, it is not essential that the passage within the said wall be helical.

As an alternative to the apparatus hereinbefore described, and shown in the accompanying drawing, gas making apparatus or a coke oven of normal construction can be used provided their dimensions are suitable for the purpose.

WHAT I CLAIM IS:—

1. A method of producing combustible gas, comprising charging natural or synthetic rubber or synthetic resinous material or other combustible materials which produce obnoxious smells when burnt in a stove or furnace into a chamber, creating a fire at or below the bottom of the charge of material in the said chamber, withdrawing hot combustion gases from said fire through a wall enclosing said chamber, readmitting said hot combustion gases to the charge of materials at a substantially higher level in the said chamber, and taking off the gases evolved.

2. Apparatus for carrying out the method according to claim 1, comprising a wall of refractory material enclosing and forming a vertical chamber, said wall being formed of inner and outer skins separated from each other to form a space therebetween, openings in the inner skin of said wall at intervals therearound and in the height thereof to provide communication between said wall space and said chamber, means for closing such of said openings as may be desired, a furnace below said chamber, means above said chamber for charging the said combustible materials thereinto, and means for withdrawing gases from the top or upper por-

tion of said chamber.

3. Apparatus according to claim 2, wherein the said wall is cylindrical and there is an annular space between the two skins of said wall, the said annular space being formed as one or more helical passages by providing webs between the said inner and outer skins of the wall.

4. Apparatus according to claim 2 or 3, wherein the outer skin of said wall is provided with orifices aligned transversely of the said chamber with each orifice in the inner skin of the wall, and each said orifice in the outer skin of the wall is provided with a movable closure device.

5. The method of producing combustible gases substantially as described herein.

6. Apparatus for producing combustible gases according to the method of claim 1, substantially as described herein and shown in the accompanying drawings.

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PROVISIONAL SPECIFICATION

Improvements in or relating to the Production of Combustible Gas

I, JAMES TYHURST COLLIER, a British Subject, of 73, Coggeshall Road, Marks Tey, Colchester, Essex, do hereby declare this invention to be described in the following statement:—

This invention relates to the production of combustible gas, the object being to provide an improved process.

According to this invention, a method of producing combustible gas comprises heating natural or synthetic rubber or synthetic resinous material or other combustible materials which produce obnoxious smells when burnt in a stove or furnace to a temperature such that it will decompose without burning, and taking off the gases thereby evolved.

Scrap rubber, such as old and worn rubber tyres from vehicle wheels, can be used to provide combustible gas according to this invention. The gases so evolved are useful for many industrial purposes.

The scrap rubber may be decomposed in a gas producer so that it is heated to such a temperature as to decompose without burning, and thereby give off combustible gases without producing the obnoxious smells and smoke which are produced when scrap rubber is burnt in a stove or furnace.

There is a large supply of scrap material from old tyres available for use. Whilst the main portion of the carcase of a worn tyre can be used, by cutting it up to make link mats and other articles, the bead portions of the tyre usually are unusable because of the presence of steel wires therein, which wires would have to be cut and probably removed.

By heating the scrap rubber, including the beads of tyres with the steel wires embedded therein, in a gas producer there is no need to cut it up.

It will be desirable to heat the rubber to a temperature exceeding 250 degrees Centigrade, to ensure that it decomposes; this involves no additional trouble because it is most unusual for a producer to make gas at a temperature below this figure. However high the temperature to which the material is heated, neither the material nor its gases can burn until they have access to oxygen (air).

Other similar scrap material could be used, for example, scrap polythene or other synthetic resinous rubbery material or other combustible material which normally produces obnoxious smells when burnt in a stove or furnace.

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888,745 COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.